Section 1:
Introduction and Overview of the Watershed

Morgan County's Watershed Initiative – Background of Receiving a Section 319 Grant

In July of 2001 The Morgan County Soil and Water Conservation District (SWCD) entered into a contractual agreement with the Indiana Department of Environmental Management (IDEM). The purpose of the agreement was to hire a watershed coordinator, engage the public in water quality prioritization and planning, and develop a watershed management plan based upon research, public input, and public priorities.

The agreement between the SWCD and IDEM was the result of a grant application prepared and submitted by the SWCD under the Section 319 program, a funding program referencing Section 319 of the Clean Water Act and focusing on nonpoint source water pollution. The grant application was screened by IDEM and consolidated with other grant applications submitted by other SWCDs, local governments, and nonprofit organizations. The result was a consolidated package of grant applications submitted by IDEM to the United States Environmental Protection Agency (EPA). Through this submittal, IDEM requested funds for many local watershed projects in Indiana as well as funds to help pay another federal agency, the United States Department of Agriculture Natural Resource Conservation Services (USDA NRCS) to provide technical support to IDEM and to those communities receiving funds to develop plans.

EPA approved the package of grant applications and provided funding to IDEM. IDEM then, in turn prepared the aforementioned contractual agreements with the Morgan County SWCD and other communities that prepared and submitted successful grant applications.

After some public involvement and analysis of the contract, the Morgan County SWCD agreed to enter into the contract with IDEM. The contract called for 24 months of public coordination, research, and plan writing for a 52,438-acre watershed that ultimately drains to the Upper West Fork of the White River in the north central part of Morgan County. The contract became effective in May of 2001.

Between May and September of 2001, the SWCD held the first of 8 quarterly stakeholder meetings (public meetings) required in the contract. Over 50 people attended the first meeting, which was held at Bradford Woods. A great deal of interest was generated at this meeting, and the NRCS representatives (contracted by IDEM) who attended the meeting recommended that four watershed committees be developed at that time. These committees included Education and Outreach, Land Use, Technical, and Steering. The role of the Steering committee was to coordinate and consolidate research and planning efforts of the other three committees. Another recommendation was for each of these committees to hold monthly meetings, in addition to the 8 quarterly stakeholder meetings described in the contract.

In September of 2001, the SWCD chose to hire contract personnel to serve the role of "watershed coordinator". The SWCD entered into a sub-contractual agreement with a professional environmental staffing company, Goode & Associates, Inc., whose specialty is water quality management, policy analysis, and watershed coordination. This subcontract allowed for 20 months (what remained in the initial 24 months) of coordination, meeting facilitation, water quality field sampling, map preparation, and various related coordination and management services. Goode & Associates, Inc. provided a "Coordination Team" (referred to throughout this document) consisting of a land use planner, a biologist/water quality chemist, an agricultural specialist, a local government policy and regulatory specialist, and a Geographical Information Systems (GIS) mapping and database specialist.

This document represents the overall watershed analysis and inventory prepared by the watershed coordination team with consistent input from committee members and the public, and the recommendations for water quality improvement and protection that resulted from such efforts.

Public Participation and a Locally Developed Management Plan:
Public participation played a major role in the analysis and preparation of this document. The Morgan County Watershed Initiative engaged the public over a period of two years to ensure that all aspects of this analysis and planning process were led by the citizens of Morgan County. Some details of this effort are discussed in Section 2 of this document.

With the assistance of the IDEM and the NRCS, an initial meeting among stakeholders (those who live in, work in, or have some particular interest in the watershed) was held in Griffith Hall at Bradford Woods on July 19th 2001. Those who assisted in facilitating this meeting included personnel from the IDEM, NRCS, and Morgan County SWCD. At this meeting several committees were established, including a Land Use Committee, a Technical Committee, an Education and Outreach Committee, and a Steering Committee where the other three committees could coordinate their efforts and collectively develop a plan.

The many participants initially established themselves as the "West Central Morgan County White River Initiative". After a short time however, the participants chose to simplify the name of the effort as simply, the "Morgan County Watershed Initiative." The Initiative established itself as a partnership of citizen stakeholders with the following mission: "*The purpose of the Morgan County Watershed Initiative is to develop a plan to understand our impacts on the West Central Morgan County White River Watershed and to protect and improve water quality*."

In addition to this mission statement, the participants in the first meeting established what they felt at the time to be seventeen "Concerns". These concerns as recorded at the first meeting included:

- Unmanaged growth.
- What streams are impaired? By what and during which season?
- Erosion-county and utility practices and urban development.
- Herbicide spraying-roadsides, utility areas.
- Illegal dumping.
- Farm practices-buffers, herbicides, livestock production and animals in the creek.
- Leaking underground storage tanks.
- Logging practices.
- Runoff from roads and impervious surfaces.
- People in the streams.
- Lack of access to river for recreation.
- Educating residents.
- What is upstream of the river?
- How to consolidate what information is known and how to make it available?
- Failing septic issues, to include treatment capacity and what to connect.
- Riparian vegetation-aquatic habitat improvement and stream bank erosion.
- Failed septics and the impact on drinking water supply.

These seventeen concerns evolved and were fine-tuned and consolidated throughout a watershed coordination and planning process that attempted to involve public input wherever and to the greatest extent possible. Throughout the course of the two-year analysis and planning period, the Initiative held over 50 committee meetings and eight quarterly stakeholder meetings. The eight quarterly stakeholder meetings were heavily advertised for public participation through U.S. mailing and e-mailing invitations, radio announcements, newspaper articles, and flyers posted at public places. While not always publicized, all of the Watershed Initiative committee meetings were also open to public participation.

1.1 Description of the Watershed:

1.1.1 Overview

Morgan County's White River/Lambs Creek watershed falls within the Upper White River West Fork Basin in Central Indiana. The Upper White drains to the White River Basin, which in turn drains to the Wabash River and then to the Ohio River. The Ohio River drains to the Mississippi, which ultimately feeds the Gulf of Mexico. As this chronology of drainage suggests, activities within the Morgan County White River Watershed can play a role, albeit minor, in the overall health of the Mississippi Basin and the Gulf of Mexico.

The area of focus for this watershed plan is the watershed to White River inside Morgan County, Indiana north of the City of Martinsville. This total drainage area encompasses 52,438 acres and is identified by the Hydrologic Unit Code (HUC) No. 05120201-160. Morgan County borders Marion County to the south and is considered a "donut county", experiencing the early effects of suburban population growth and urban sprawl. The watershed is dominated by forest, agriculture, and rural residences. The City of Martinsville, which is Morgan County's largest city and the County Seat, lies in the southernmost point of the watershed and in the center of Morgan County. The watershed is further divided into six subwatersheds, each identified by a unique 14-digit hydrologic unit code. Figure 1.1 provides a map of the watershed. Figure 1.2 shows where the subject watershed falls within the encompassing 8-digit Upper White River West Fork Basin.

1.1.2 Geology and Geographic History

Morgan County's diverse landscape provides a unique look at its natural history. The border separating glaciated northern Indiana from the unglaciated southern portion of Indiana can be observed in the northern reaches of the watershed. Wisconsinan and Illinoian glaciation had the greatest effects on what can be observed today, which is flatter ground in the north and hillier ground in the south. Wisconsinan glaciation terminated near the Martinsville area, in the southern portion of the watershed (central Morgan County). The White River valley drained much of the glacial ice, which flowed southward into the hills of southern Morgan County.

1.1.3 Natural History

Due in part to the diversity of soils in the watershed, which is also a result of glaciation in the area, the entire natural system within the watershed is quite diverse.

Native vegetation in the area is generally broad-leaf deciduous forest. Virtually all old growth hardwoods have been cut at one time or another, leaving newer growth forest and agricultural lands dominating the watershed.

Native wildlife and its evolution is similar to that found throughout the state of Indiana.

1.1.4 Cultural History and Resources

The following information regarding cultural history and resources was compiled by Joanne Raetze Stuttgen, Ph.D. As a resident of Martinsville, Dr. Stuttgen is a stakeholder in the Morgan County White River Watershed, serves on the Martinsville Plan Commission, and has participated on the Land Use Committee for the Watershed Initiative as both a cultural history expert and a residential stakeholder.

Human occupation of the White River Watershed is estimated to have occurred as early as 11,000 years ago. Early Native Americans established settlements and transportation routes through the area, leaving behind a rich and amazing variety of cultural artifacts. (Among the rarest of these found by a local collector are six Clovis points dating from approximately 9,000 BC.) More recent Native peoples were the Miami, Delaware and Shawnee. They, too, left behind evidence of their long occupation. Within the Watershed, the most recently documented site is the Voyles-Bundy Site, located on the east side of SR 39 at White River. Excavated in 1995 by Indiana University, the site is estimated to have been occupied by the Delaware between 800-1200 years ago.

The period of initial occupation by Anglo-American settlers began during the years between Indiana statehood in 1816 and the cession of lands comprising southern Indiana by the Miami Indians in 1818. The first public sales of land in the area that would become Morgan County occurred in 1820. The county itself was organized in 1822. Early platted villages within the Watershed include Martinsville, the Morgan County seat, platted in 1822; Monrovia (1834); Centerton (1854); and Hall (1851-52). The majority of early settlers migrated into southern Indiana from Appalachia, bringing with them cultural traditions of the Upland South: speech and agricultural patterns, foodways, architecture, even political ideology. During this period of initial settlement (1816-1853), pioneers established home sites and communities along White River and its creek tributaries. They felled the native trees—poplar, walnut, white oak, hickory, beech, maple and other varieties—and cleared the land for farms on which were raised corn and livestock, especially hogs. The bluffs were used for grazing.

Pork packing was a major early industry. Flatboats loaded with pork and grain were regularly sent down White River to New Orleans. Other pioneer-era industries dependent on the area's natural resources included saw and gristmills; brick making; and the quarrying of limestone for bridge abutments and building foundations.

Among the most significant historic resources within the watershed remaining from the pioneer era (c1816-1853) are two houses built c1850 and c1860 on the Bradford Estate property in the White River-Centerton Subwatershed; Elm Spring Farm (c1860) in the Lambs Creek-Goose Creek Watershed; the Mt. Pleasant, Stout, Highland, Mt. Zion and Poplar Grove Methodist Episcopal Cemeteries in the Lambs Creek-Patton Lake Subwatershed; and the Hastings and Nutter Cemeteries and Hendricks Farm, located north of Martinsville along Blue Bluff Road, in the White River-Martinsville Subwatershed. The Bradford Estate property and Elm Spring Farm are listed on the National Register of Historic Places.

The completion of the railroad through Martinsville in 1853, and through Mooresville—the largest town in the northern part of Morgan County—in the 1860s, boosted the county's agricultural economy by providing a link to distant markets. Pre-Civil War-era prosperity and an increasing population that demanded more public services and structures—churches, schools, commercial business, professional services—is reflected in a number of significant historic properties that mark the mid-nineteenth-century. These include a number of rural one-room schoolhouses in each subwatershed, as well as fine brick houses and the commercial district in Monrovia.

Due in large part to the coming of the railroads, Morgan County experienced a period of growth and maturity between 1853-1910. No longer solely reliant on fulfilling its own needs, residents turned to outside sources for necessary and desired goods such as building supplies, household goods, farm implements, clothing and machinery. Improved roads were necessary to transport goods such as these from the railroad stations in Martinsville and Mooresville. Several corporate organizations, such as the Monrovia and Hall Gravel Road Company, were organized. Improved roads brought a second generation of bridges, mostly iron trusses that replaced wood covered bridges. An outstanding historic example of a Pratt through truss, County Bridge No. 146, also known as Lamb's Creek Bridge (1893) is found in the Lamb's Creek/Goose Creek Subwatershed. The peculiar plate girder Lake Ditch Bridge (fabricated 1895, placed over Lake Ditch 1926) is found in the Lambs Creek-Patton Lake Subwatershed. Both bridges are on the National Register of Historic Places.

The years between 1853 and 1910 saw a number of families establish large farming enterprises in areas of rich, sandy loam in the White River bottoms and in the northwest portion of the county. This area had been a natural marsh before being drained between 1875-1916 with

the construction of Lake Ditch and a number of smaller ditches.

In the Lambs Creek-Patton Lake Subwatershed, the Hurt family owns hundreds of acres near Hall that are drained by Lake Ditch. In the White River-Centerton Subwatershed, the Milhon family has owned and cultivated the rich river bottom farmland for approximately 100 years. And in the Lamb's Creek-Goose Creek Subwatershed, the land owned by Jim and Ann Lankford has been continually farmed by four generations. These families are exceptions to the norm, however, as most farmers in the Watershed subsisted on significantly less acreage of poorer quality in regards to topography, natural irrigation, soil type (predominantly clay, shale and sand) and natural cover such as trees and other native plants.

Beginning about 1895, Morgan County entered a period of specialized industry dependent on its rich variety and abundance of natural resources. A number of unique businesses found a home in the White River Watershed. In 1888, the Bradford family (of the previously mentioned Bradford Estate, White River-Centerton Subwatershed) discovered a high quality of sand on their property along the banks of Sycamore Creek, mined it and sold it to cast metal mold companies. They acquired over 2,000 acres in the area and built the Bradford Sand Mining Company into a major local business. Nearby in Centerton and Brooklyn, which lie just outside the Watershed, clay and shale were mined and used for the production of brick and tile.

Another one-of-a-kind enterprise, Grassyfork Fisheries, a goldfish hatchery, was located in the White River-Martinsville Subwatershed. Established in 1899 by Eugene Shireman, who capitalized on the area's natural springs and low areas, Grassyfork was by World War II the largest producer of goldfish in the world. The success of Grassyfork encouraged others to enter the fish-raising business. In the Lambs Creek-Goose Creek Subwatershed, for example, local farmer Elmer Fowler raised game fish in 14 pounds on his property for almost 50 years. The Indiana Department of Natural Resources also maintains hatcheries along SR 37 north of Martinsville. A major industry in Martinsville, which lies largely outside the Watershed, was mineral water spa/sanitariums from 1887-1965 (peak years 1900-1930).

A gold mining company operated in the early 1900s along Sycamore Creek in the White River-Highland Creek Subwatershed. It fell to the wayside, but a second venture was again in place during the 1930s and early 1940s. On top of Jake's Butte in the Lambs Creek-Goose Creek Subwatershed, another small mining operation was active in the 1930s. The remnants of quickly-erected miner's cabins and household goods—tin cans, pieces of broken ceramic crocks—can still are found on top of the Butte.

With increased mobility through the use of the Interurban and privately owned motorcars, Morgan County waterways—especially White River—became popular sites for recreation. Private clubs included Rettun Lodge, owned by the Nutter family, and the High Rock Cabin, both located on White River at High Rock. Numerous fishing camps along the sandy banks of the river along the current SR 67, such as Kirkwood and Idle Hours, were available to less prosperous residents. North of Martinsville, the Blue Bluffs Resort was a popular destination for rental cabins, canoes and rowboats, swimming, dancing, picnics and a nearby restaurant specializing in fried chicken.

In 1916, a number of Clay Township residents came together to offer land along Sycamore and Gold Creeks (White River-Highland Creek Subwatershed) to the state for development as a state park. The area was praised for its lush fern glens, canyons filled with cottonwood and quiet nooks of natural beauty. The park was never developed.

Major floods in 1875 and 1913 saw Morgan County's creeks and White River raise to unprecedented levels. The flood of 1913 was a repeat of the earlier tragedy. After nearly 48 hours of continuous rain on March 24-25, 1913, the White River escaped its banks at Centerton and swept into Martinsville. Estimated to be a

mile in width in some places, the swollen river destroyed the rail and Interurban lines, washed out bridges and downed telephone lines. A less devastating flood occurred again in 1930. In hopes of preventing still more disasters, the Army Corps of Engineers constructed the existing levee on the east side of White River north of SR 39 sometime in the mid-1950s.

Another notable federal assistance project within the White River Watershed was the construction of Patton Lake (Lambs Creek-Patton Lake Subwatershed) by the Army Corps of Engineers in the late 1930s. The lake originated as a hand-dug pond held by an earthen berm, both of which were constructed for the use of Morgan County Boy Scouts. Dedication of the new, federally-funded lake was July 4, 1938. Patton Lake—also known as Patton Park—was for many years the premier public recreation area in the Morgan County. Beginning in the early 1960s, the Patton Park/Lake area entered a period of slow decline and neglect that is so evident today.

Also in the 1930s, the Civilian Conservation Corps was involved in selective reforestation in the White River Watershed. A representative example is the planting of pine seedlings at Elm Spring Farm (c1860), located on Goose Creek. The farm was worn out and depleted, the hills grazed bare, when it was lost by the homesteading family during the Depression. The new owners were not farmers and used the property as a private summer retreat, which they shared with local Girl Scouts. With the help of the CCC, they worked to restore and reclaim the land. In recognition of their efforts, Elm Spring Farm was listed on the National Register of Historic Places in 2001.

While Elm Spring Farm was being reclaimed during the 1930s, other significant properties were just being built. The most significant among those remaining from this period is the Goethe Link Observatory (1937) high atop Observatory Hill in the Sycamore Creek Subwatershed, and Foxcliff Estate (1934-1935), a massive Tudor style residence built for Frank Shields, owner of the Barbasol Company. Located in the White River-Martinsville Subwatershed, Shields's house and 800-acre estate was developed into Foxcliff North and South, one of central Indiana's premier golfing residential communities.

From the period of Native American occupation to the present, the White River Watershed is an area rich with significant cultural resources. It is the hope of the professional and community members of the West Central Morgan County White River Watershed Initiative that these resources will continue to be respected, researched, preserved and promoted during the current and any future projects.

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Reynolds, Elmer. Telephone interview with Joanne Raetz Stuttgen, 18 March 2003.

Stuttgen, Joanne Raetz. 1995. *Martinsville: A Pictorial History*. St. Louis: G. Bradley.

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Figure 1.1

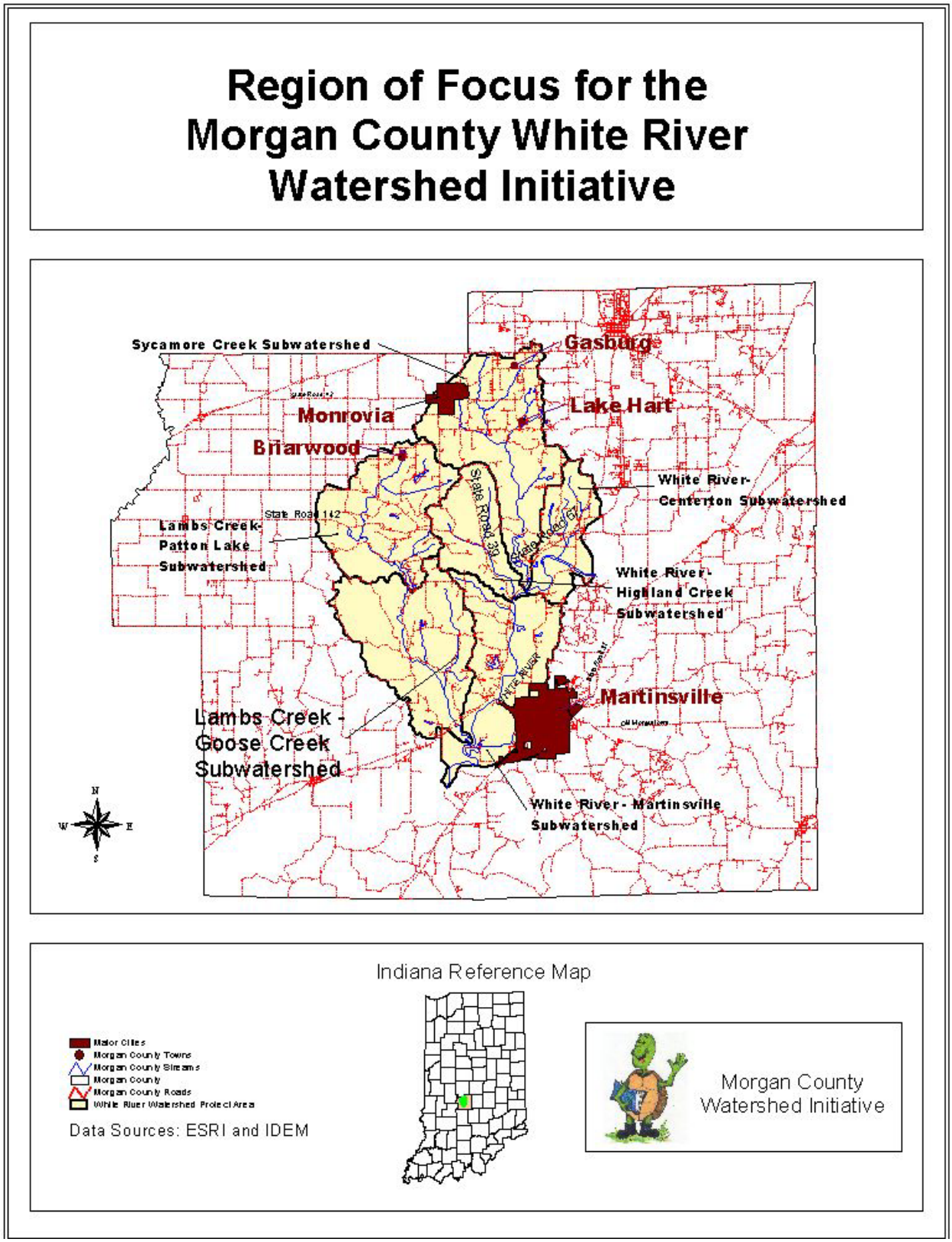
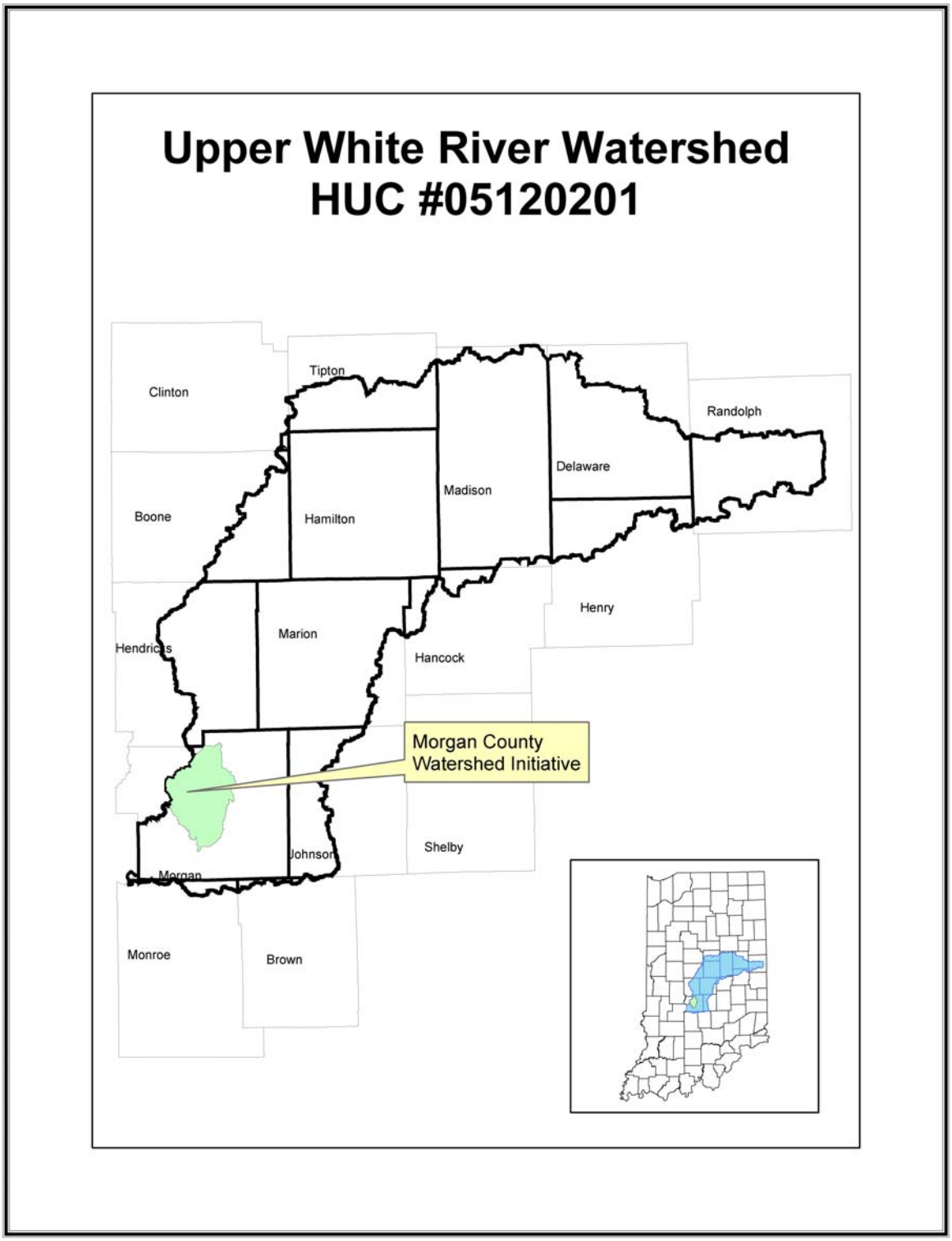


Figure 1.2, Map showing encompassing 8-digit Upper White River West Fork Basin



1.1.5 Current Land Use

The land use in the watershed is made up predominantly of rural residential, agriculture, state-owned land, and small urban communities. Among these land uses, forest canopy is

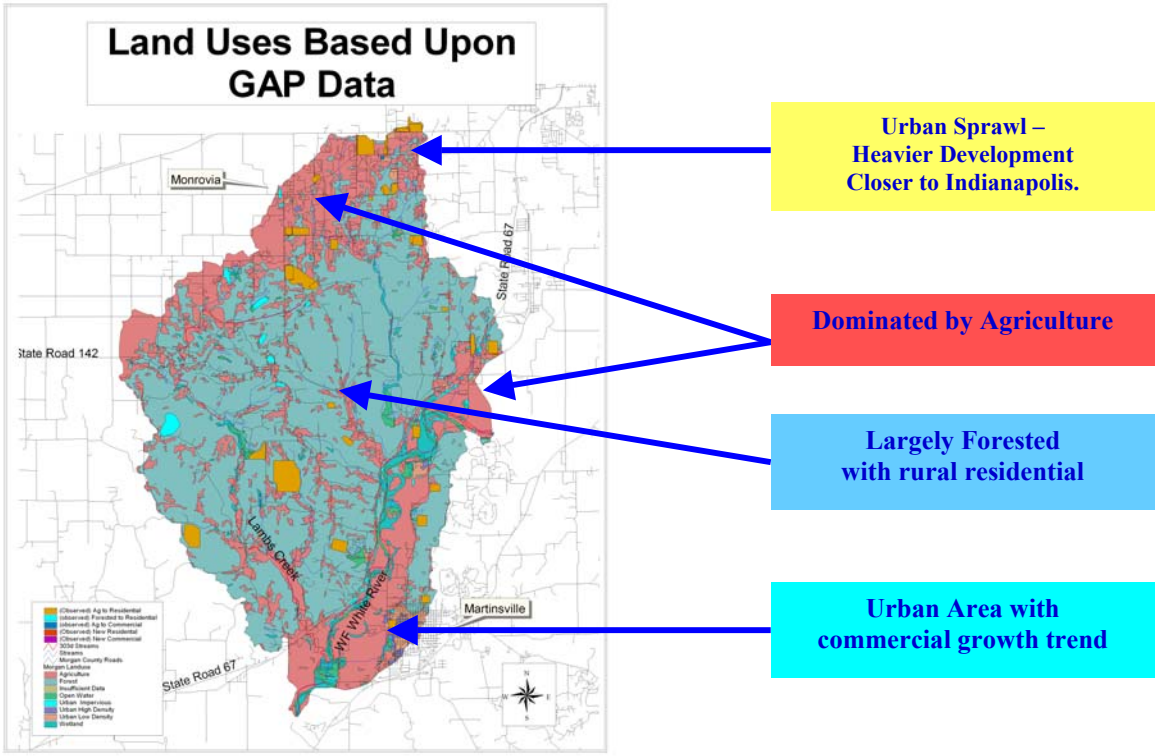
predominant, covering nearly 60% of the watershed.

The northern portion of the watershed is predominantly agricultural lands that are experiencing some suburban development pressure from the Indianapolis area. The Town of Monrovia, with a population of roughly 700 is situated in this area, in the northwestern portion of the watershed. Residential and commercial growth is anticipated to dramatically impact the area around Monrovia over the next several years. Several recent and pending property acquisitions, re-zoning requests, and development proposals point to significant population growth and associated land use change around Monrovia in coming years.

The middle portion of the watershed is predominantly forested lands owned by private residences, Indiana University, and others. The Indiana University Board of Trustees owns Bradford Woods, a 2,575-acre tract made up mostly forested hills and valleys, campgrounds and a small lake. In its current state, Bradford Woods provides extremely valuable wildlife habitat, natural areas, and buffer from pending population growth from the north (Indianapolis/Monrovia) and the south (Martinsville).

The southern portion of the watershed includes the City of Martinsville, with a population of nearly 12,000. Figure 1.3 below provides a very generalized view of the land use in the watershed using GAP (Gap Analysis Program) Data. GAP data is managed by the USGS and identifies various different land uses with the goal of providing resource managers with the ability to make informed land use decisions.

Figure 1.3



According to GAP Project data analysis combined with aerial photography and field observations, the following tables 1.1 and 1.2 describe land uses in the watershed divided into acres and percentages:

Table 1.1 identifies land uses in the watershed by acreage:

Land Use in Acres							
	West Central Morgan County White River Watershed	Sycamore Creek	Lambs Creek-Patton Lake	Lambs Creek-Goose Creek	Highland Creek	White River Centerton	White River Martinsville
Pasture	7,049	2,718	1,270	1,558	542	337	624
Row Crops	10,232	2,218	1,875	996	189	1,319	3,635
*Deciduous Forest***	31,693	6,570	6,254	8,432	4,345	2,184	3,942
Conifer Forest	119	36	27	7	4.3	30	15
Open Water	756	142	95	27	1.0	91	400
Urban High Density	207	14	0	0	0	10	183
Urban Impervious	309	33	44	0	0	105	127
Urban Low Density	567	99	0	0	.5	29	438
Wetland***	1,492	138	104	107	42	395	706
Total Acres	52,438	11,968	9,669	11,127	5,124	4,480	10,070
** Includes mixed forest, shrubland, woodland *** Includes several wetland types							

Table 1.2 identifies land uses in the watershed by percentage

Land Use in Percent							
	West Central Morgan County White River Watershed	Sycamore Creek	Lambs Creek-Patton Lake	Lambs Creek-Goose Creek	Highland Creek	White River Centerton	White River Martinsville
Pasture	13	5.2	2.0	3.0	1.0	0.6	1.2
Row Crops	20	4.2	3.6	2.0	0.4	2.5	7.0
*Deciduous Forest***	60	13.0	12	16.0	8.3	4.0	7.5
Conifer Forest	0.2	0.1	0.05	0.01	0.01	0.05	0.02
Open Water	1.4	3.0	0.2	0.05	0.002	0.17	0.8
Urban High Density	0.4	0.02	0	0	0	0.02	0.3
Urban Impervious	0.6	0.06	0.08	0	0	0.2	0.2
Urban Low Density	1.1	0.2	0	0	0.001	0.05	0.8
Wetland***	3.0	0.3	0.2	0.2	0.1	0.8	1.3
** Includes mixed forest, shrubland, woodland *** Includes several wetland types							

Table 1.3 identifies local activities and conditions with potential for impacting water quality.

Activities or Conditions with *Potential* for Impacting Water Quality
Morgan County White River Watershed (WORKING DRAFT)

Underground Storage Tanks	166
Leaking Underground Storage Tanks	41
NPDES Dischargers (*)	10
Hazardous Waste Generators	72
Hazardous Materials Handlers	5
Septic Systems	Unknown – estimated between 5,000 and 8,000
Failing Septic Systems	Unknown – many reports exist at Health Dept.
Livestock Operations (small/unregulated)	39 (estimated based on field observations)
Drinking Water Intakes from Surface Water	At least 4 public. Private unknown
Auto Salvage Yards	5
Dumping or refuse collection	50 + identified in field
Streambank Erosion Priority Areas	
Other Erosion Problem Areas (Ag/Devel)	
Drainage Complaints	Begin Recording at SWCD
Other Issues/Conditions	
Impervious Surface Area Coverage:	309 acres based upon aerial photos/GAP data

Preserved or protected areas	
Classified Forest Owners	34
Classified Forest Acreage	2,029 acres
Managed/Public Forest Lands	2,343 acres
Total Forest (see Land Use Percent chart) (not necessarily "protected"	31,812 acres
% of total forested land "protected"	Approx. 14.6 %
Old Growth Forest	N/A
New Growth Forest	31,812 acres

1.1.4.2: Agriculture

While agriculture is not the most dominant land use in the watershed, row cropping dominates the northern, flatter lands around Monrovia as well as the floodplains along White River. Small livestock operations are found scattered throughout the watershed. The majority of those operations are cattle. Horses, goats, llama, and pigs are also present. No livestock operations in the watershed meet Indiana's definition of a confined feeding operation.

Agricultural issues are covered in ***Section 5, Row Crop Management Issues*** and in ***Section 6, Livestock Management Issues.***

1.1.4.3 Solid and Hazardous Waste Sites:

There are both regulated hazardous materials handling locations and hazardous waste sites located in the watershed. Both of these are covered in ***Section7, Commercial and Industrial Issues.***

1.1.6 Soils

According to the USGS National Water Quality Assessment Program Report for White River, the watershed is composed of two primary hydrogeomorphic strata, the till plain and the bedrock upland (USGS National Water Quality Assessment Program). The till plain in the upper portion of the watershed is flat to gently rolling and consists of buried pre-Wisconsin till with overlying Wisconsin till at the surface.

Lenses of sand and gravel occur in the loamy till and the drift ranges from 50-400 feet thick. The bedrock uplands make up the southern portion of the watershed and consist of relatively resistant siltsones, sandstones, limestones, and shales. Differential erosion has produced the relatively high relief hill and valley landscape that characterizes the bedrock uplands strata.

Soil types vary significantly within the watershed area. According to the Morgan County Soil Survey, there are five areas within the watershed where general soil types differ. These include:

(1)The northern third of the watershed, which is dominated by deep, nearly level to very seep, well drained to somewhat poorly drained soils on uplands. The two primary soil types in this area are: the Miami Crosby series, characterized as deep, nearly level to very steep, well drained and somewhat poorly drained soils, limited in their susceptibility for soil loss and erosion poorly suited for use as septic absorption fields, that formed in loess and the underlying glacial till on uplands; and the Miami-Fincastel-Xenia series, characterized as deep, nearly level to very steep, well drained to somewhat poorly drained soils, limited in their susceptibility to erosion and soil loss, poorly suited for use as septic absorption fields that formed in loess and the underlying glacial till on uplands.

(2)The upper middle section of the watershed, which includes areas dominated by moderately deep and deep, gently sloping to very steep, well drained soils on uplands. The predominant soils series in this area of the watershed include Hickory-Bedford, Hicorky-Cincinnati-Ava, and Vigo-Ava-Cincinnati

(3)Much of the middle of the watershed is dominated by the upland Berks-Gilpin-Zainesville series, which are moderately deep and deep, gently sloping to very steep, well drained solis that formed in residuum of sandstone and sale or in loes and the underlying residuum of sandstone.

(4)Alford-Grayford, Alford-Hickory, and Parke-Chetwynd-Pik series dominate a portion of the southwestern portion of the watershed near Martinsville. These are mostly deep, nearly level to strongly sloping well drained soils.

(5)Finally, the Wakeland-Banlic-Wilber and Gennessee- Shoals series dominate the areas of the watershed that border White River. These are deep, nearly level, somewhat poorly drained and moderately well drained solids on bottom lands and low terraces.

1.1.7 Topography

Morgan County is described by in the Soil Survey of Morgan County (USDA Soil Conservation Service), Indiana as complex, with a range of relief from 970 feet above sea level to 550 feet above sea level.

The northern portion of the county, which includes the northern portion of the watershed, is nearly level and rolling and has few abrupt changes in elevation. The central and southern parts of the county (roughly the southern two-thirds of the watershed) vary more in elevation and have sharp drops of as much as 250 feet from the ridgetops to the bottom lands.

The White River valley is characterized by broad flat flood plains, which flow from the northeast to the southwest.

1.1.8 Hydrology

1.1.8.1 Streams:

The primary drainage system in the watershed is the White River. The White flows through the eastern portion of the watershed and drains much more area from the west. Tributaries to the White River within the watershed include:

Lambs Creek, which drains a total of 20,798 acres in the western and northwestern portion of the watershed. The Lambs Creek watershed is subdivided into two 14-digit hydrologic unit coded watersheds: Upper Lambs Creek and Patton Lake (HUC) and Lower Lambs Creek and Goose Creek ( ). Several of the smaller tributaries have dams constructed to retain small impoundments. The most significant dam and reservoir is Patton Lake, which divides Upper and Lower Lambs Creek.

Sycamore Creek, which drains a total of 11,969 acres in the north central portion of the watershed.

Highland Creek, which drains a total of 5,129 acres in the eastern portion of the watershed.

White River, which drains a total of 14,543 acres in the eastern and southern portions of the watershed. This section of the White River Watershed is subdivided into two 14-digit hydrologic unit coded watersheds: White River near Centerton (HUC) , which drains a total of 4,470 acres and White River near Martinsville (HUC), which drains a total of 10,073 acres in the southern portion of the watershed

1.1.8.2 Wetlands

What remains of the area's natural wetlands are scattered about the watershed and are represented in both palustrine and riverine systems. Palustrine wetlands typically stand alone from more identifiable bodies of water such as rivers and lakes and are characterized by trees shrubs and a variety of emergent vegetation. Riverine wetlands are typically found along rivers and streams and are characterized by both submergent and emergent vegetation.

1.1.9 Land Ownership

The majority of the property inside the watershed is privately owned. However, a large section (approximately 2500 acres) is owned by the Indiana University Trustees and is known as Bradford Woods and Camp Riley. Many of the privately owned properties around Bradford Woods are 10-30 acres in size. However, several significant landowners (estimated to own 100 acres or more, based on plat map observations) are listed below:

- Weston Paper and Manufacturing Company, which owns several forested acres west of Patton Lake.
- Patton Park Inc., which owns much of the property surrounding Patton Lake in the Lambs Creek Watershed
- Indianapolis Power and Light (AES IPALCO), which owns Pritchard Park and a power plant along White River, both in the White River Centerton Watershed.
- The State Convention of Baptists, which owns nearly 350 acres of forested property in the Highland Creek Watershed.
- The Crone family
- Rhoades Investment Co., Inc.
- Barnard family and farms
- The Milhon family
- The Farr family
- The Cragen family
- The Wagoner family
- The Ruby family

There are at least two conservation clubs in the watershed. These include:

- the Mallory Conservation Club, which owns 266 acres in the Sycamore Creek Watershed
- the Victor Conservation Club, which owns 40 acres.

There are two dedicated preservation/conservation areas in or adjacent to the watershed. These include:

- Central Indiana Land Trust, Inc. (CILTI), which owns a 14-acre tract called Shalom Woods off Observatory Road.
- Nature Conservancy, which owns 31.8 acres in eastern portion of the White River Centerton Watershed

Several subdivisions, commercial parks, and industrial parks can also be found in the watershed, especially in and around the communities of Martinsville and Monrovia.

1.1.10 Rare and Endangered Species

The watershed and proposed project areas are within the range of the federally endangered Indiana bat (Myotis sodalis) and the federally threatened bald eagle (Haliautus leucocephalus).

Bald eagles currently reside in the watershed. In the early 1990's, a nesting pair was established at Bradford Woods in the southern portion of the Sycamore Creek Watershed. Staff at Bradford Woods named the male eagle, "General Patton" and the female, "Rainbow". General Patton also nested with another female in a protected area in the northwestern end of Patton Lake in the Lambs Creek/Patton Lake watershed. The nest at Patton Lake has had successful reproduction. Later in 1997, Another male that the Bradford Woods staff named, "Casanova" took over the nest at Bradford Woods.

The presence of two nesting pairs of bald eagles within this one watershed in Morgan County suggests that the watershed provides both woodland and aquatic habitats necessary these birds at a level of quality that is sufficient for their needs.

Information regarding state endangered species can be obtained from the Indiana Department of Natural Resources.

Public Sanitary Wastewater Treatment Services

Sanitary sewer service and wastewater treatment is provided in City of Martinsville, Bradford Woods, and the Town of Monrovia. Residences outside of the sewered areas in the watershed utilize septic systems for sanitary waste disposal. The Morgan County Health Department has identified four areas of consolidated homes inside the watershed where failing septic systems and associated leachate are known to be a problem. These areas include:

Patton Lake
Lake Hart
Lake Edgewood
Centerton

More detailed discussions regarding septic systems are provided in ***Section 3, Septic Systems and Residential Issues.***

Priority Goals #1-4 for this Watershed Management Plan.

This Watershed Management Plan is divided primarily by land use, in order to provide the reader with readily accessible, pertinent information regarding the type of land use in which the reader is interested.

In most cases, the plan addresses the same topics, questions, and issues in each section in order to be consistent and to provide direct information related to the EPA and IDEM requirements of the contract that supported this plan. Additionally, each section identifies ***objectives*** and recommended ***actions***, which are directly related to the plan section. Each objective and action supports the ***Primary Goals*** of this Watershed Management Plan.

The following are considered primary goals to be achieved through both the development ***and*** implementation of this Watershed Management Plan. Together, these constitute the overall, umbrella goals of this entire effort. Sections within this document will support these Primary Goals. Goals for ***plan development*** are identified as Primary Goals #1-3. The ultimate goal of plan ***implementation*** is Primary Goal #4. This goal will be supported within each section of this plan by Objectives, Management Measures, and Action Plans.

Primary Goal #1:

Identify land use activities in the watershed that affect water quality

Primary Goal #2:

Identify existing water quality problems in the watershed

Primary Goal #3:
Prioritize geographical areas and land use activities in the watershed based upon water quality and land use.

Primary Goal #4:
To the greatest extent possible and with existing and potential resources, improve and protect water quality in the watershed with the intention, where applicable and appropriate, to achieve and maintain state water quality standards.

Basic Facts – The Watershed At a Glance

Watershed Name:	**White River-Lambs Creek**	
Hydrologic Unit Code:	**051120201-160**	
Location:	**North-central Morgan County, Indiana**	
Total Area:	**52,438 acres**	
Townships Affected:	**Green, Clay, Washington, Jefferson, Gregg, Monroe**	
General Land Uses: *(approximate percentage)*	**20 % Row Crops** **13% Pasture** **60% Forested** **2% Urbanized** **3% Wetland** **1.4 % Open Water**	
Six Subwatersheds:	**Upper Lambs Creek & Patton Lake** **Lower Lambs Creek & Goose Creek** **Sycamore Creek** **Highland Creek** **White River Centerton** **White River Martinsville**	**(9,669 acres)** **(11,129 acres)** **(11,969 acres)** **(5,129 acres)** **(4,470 acres)** **(10,073 acres)**